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Mild to moderate chronic kidney disease and its relation to disability in Korean elderly population

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Background/Aims: In older people muscle weakness and cognitive dysfunction are common, and in severe cases assistance is needed for daily life. In addition, vision and hearing are reduced, walking disorders occur, and in this condition, they are called disabled. People with disabilities need continued support from family and community people, and people with disabilities have a higher mortality rate. Disabilities are known to occur and worsen when accompanied by chronic diseases such as stroke, ischemic heart disease, arthritis, diabetes and hypertension. Plantinga et al reported that disability is also associated with chronic kidney disease (CKD) and it can be induced from early CKD. We evaluated the association between disability and various chronic diseases, especially CKD, in older Koreans. **Methods:** The subjects of this study were 3rd KNHANES participants who were over 65 years old. 3rd KNHANES did not conduct a microalbuminuria test, so CKD was defined as estimated glomerular function rate<60 ml/min/1.73 m^2 regardless of urine test, and the CKD stage followed the KDIGO. Disabilities included abnormal activity of daily living (ADL), instrumental ADL and vision, hearing and walking impairment. **Results:** The prevalence of abnormal ADL in CKD stage 3a, stroke, arthritis, DM and hypertension were 22.5%, 38.6%, 20.6%, 24.3% and 18.2%, respective. The prevalence of CKD stage 3a for vision, hearing and walking impairment was significantly higher and as high as that of other chronic diseases. In multivariate logistic regression analysis, abnormal ADL and visual impairment are significantly associated with CKD 3a respectively (Odds ratio, 1.63 [95% confidence interval (CI), 1.04-2.54]/ Odds ratio, 1.39 [95% CI, 1.01-1.93). **Conclusions:** CKD was associated with the disability from the early state, and was as frequent as the previously known chronic diseases in elderly Koreans

Table 1. Clinical and socioeconomic characteristics of study subjects according to the stage of chronic kidney disease

	Overall (N=882)	No CKD (N=526)	CKD 3a (N=321)	CKD3b-4 (N=35)	P
Mean age	71.6 ± 5.7	70.5 ± 5.0	72.9 ± 6.1	76.0 ± 7.0	0.000
Male N, (%)	354 (40.1)	295, (56.1)	47, (14.6)	12, (34.3)	0.000
Obesity N, (%)	290 (33.6)	169, (32.6)	104, (33.4)	17, (48.6)	0.154
Current smoking (%)	157 (18.4)	114, (22.3)	37, (12.0)	6, (17.6)	0.001
Education, <High school N, (%)	733 (83.1)	417, (79.3)	288, (89.7)	28, (80.0)	0.000
Divorced or single N, (%)	377 (42.7)	168, (31.9)	189, (58.9)	20, (57.1)	0.000
Medical security %					0.124
Medical insurance	89.2	91.4	86.0	85.7	
Medical aid	10.4	8.2	13.7	14.3	
None	0.3	0.4	0.3	0	
Monthly income (10,000 won)	44.2 ± 43.9	45.3 ± 44.6	41.4 ± 42.2	46.9 ± 46.8	0.636
Comorbid disease					
Diabetes mellitus (%)	16.0	12.6	18.3	45.7	0.000
Hypertension (%)	54.7	49.7	60.2	80.0	0.000
Stroke (%)	6.5	5.3	7.5	14.3	0.076
Ischemic heart disease (%)	6.1	6.3	5.0	14.3	0.091
Arthritis (%)	51.8	43.0	64.2	71.4	0.000
Cancer (%)	5.1	4.8	5.0	11.4	0.219
Liver cirrhosis (%)	0.6	1.0	0	0	0.181
COPD (%)	3.6	4.2	2.5	5.7	0.349

Table 2. Prevalence of functional disability according to stage of chronic kidney disease

	Overall	No CKD (N=526)	CKD 3a (N=321)	CKD3b-4 (N=35)	P
Abnormal ADL (%)	16.2	11.3	22.5	32.4	0.000
Abnormal IADL (%)	38.3	32.0	47.3	50.0	0.000
Walking disorder (%)	45.6	39.4	52.0	80.0	0.000
Visual impairment (%)	52.0	46.0	59.8	71.4	0.000
Hearing impairment (%)	30.8	27.1	34.3	54.3	0.001

CKD: chronic kidney disease, ADL: activity of daily life, IADL: instrumental activity of daily life.

Table 3. Prevalence of functional disability in each comorbid disease

	Abnormal ADL (%)	Abnormal IADL (%)	Visual impairment (%)	Hearing impairment (%)	Walking disorder (%)
Diabetes mellitus	24.3	43.4	60.4	35.3	51.1
Hypertension	18.2	39.6	52.9	29.6	49.6
Arthritis	20.6	46.9	57.8	39.4	63.5
Cancer	9.3	39.5	48.8	32.6	58.1
Stroke	38.6	63.2	61.4	40.4	77.2
Ischemic heart disease	18.5	46.3	66.7	35.2	74.1
COPD	9.7	32.3	37.5	31.2	50.0
CKD 3a	22.5	47.3	59.8	34.3	52.0
CKD 3b-4	30.3	48.5	70.6	52.9	79.4

Table 4. The Odds ratio (OR) and 95% confidence intervals (CI) of CKD stage 3a for each component of functional disability

	Unadjusted analysis OR (95% CI)	Adjusted for Model 1 OR (95% CI)	Adjusted for Model 2 OR (95% CI)	Adjusted for Model 3 OR (95% CI)
Abnormal ADL	2.29 (1.57-3.35)	2.25 (1.53-3.31)	1.91 (1.26-2.88)	1.63 (1.04-2.54)
Abnormal IADL	1.9 (1.43-2.54)	1.95 (1.45-2.61)	1.44 (1.05-2.00)	1.04 (0.73-1.47)
Visual impairment	1.75 (1.32-2.32)	1.79 (1.34-2.38)	1.71 (1.26-2.31)	1.39 (1.01-1.93)
Hearing impairment	1.4 (1.04-1.89)	1.45 (1.07-1.97)	1.25 (0.90-1.70)	1.13 (0.79-1.62)
Walking disorder	1.67 (1.26-2.21)	1.66 (1.25-2.21)	1.34 (0.98-1.80)	0.97 (0.69-1.35)

CKD: chronic kidney disease, ADL: activity of daily life, IADL: instrumental activity of daily life

Model 1: DM, HTN

Model 2: smoking, education, marital status

Model 3: age, sex